

ALSEK RIVER CHINOOK SALMON STOCK ASSESSMENT, 1988

By

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ABSTRACT

Coded-wire tagging of wild, young-of-the-year, chinook salmon was conducted during the fall of 1988 on headwater tributaries of the Alsek River in the Yukon Territory, Canada. Approximately 16,600 juvenile chinook salmon were captured during the study period. Juvenile chinook salmon averaged 64 mm and ranged from 48 to 88 mm fork length. No growth in length of juvenile chinook salmon was observed during the study period. Minnow trap catches declined from 25 fish per trap-day on September 21 to six fish per trap-day on October 28. Highest trap catches were observed in shallow, braided, riffles often associated with large organic debris in the Tatshenshini River; trap catches were much lower in the Klukshu River. Subsequent recovery of tagged adult chinook salmon in commercial and recreational fisheries and on the spawning grounds will provide information on migration patterns, exploitation rates, and fishery contributions of the Alsek River chinook salmon stock.

KEY WORDS: Chinook, *Oncorhynchus tshawytscha*, salmon, escapement, migration patterns, length, minnow trapping, young-of-the-year, coded-wire tag, Alsek River, Pacific Salmon Treaty, exploitation rate, fishery contribution.

INTRODUCTION

The Alsek River originates in the Yukon Territory, Canada and flows in a southerly direction until it empties into the Gulf of Alaska approximately 75 km southeast of Yakutat, Alaska (Figure 1). The Dezadeash and Tatshenshini Rivers are the largest tributaries of the Alsek River. Similar to other large, glacial, transboundary rivers like the Taku and Stikine Rivers, velocity barriers and blockages prohibit migration of anadromous salmonids to most of the Alsek River drainage. The Alsek River is considered a major producer of chinook salmon; only the Taku and Stikine River support larger spawning populations in southeast Alaska. Most of the significant chinook salmon spawning areas are found in tributaries of the Tatshenshini River including the Klukshu, Blanchard, and Takhanne Rivers and Goat Creek.

Alsek River chinook salmon are harvested incidentally to the taking of sockeye salmon in a U.S. commercial set gill net fishery operated at the mouth of the Alsek River and in Canadian recreational and subsistence fisheries on the Klukshu, Tatshenshini, and Blanchard Rivers in the upper portion of the drainage in the Yukon Territory, Canada. At present, the abundance of the Alsek River stock of chinook salmon is depressed relative to historical levels. The chinook salmon harvest in the U.S. gill net fishery has been extremely variable, ranging from 22,282 in 1920 to only 60 fish in 1984 (Hubartt and Kissner 1986). Escapements of chinook salmon have declined in recent years even though the gill net fishery has been restricted to incidental harvest of chinook salmon. From 1975 to 1988, escapements of chinook salmon to the Alsek River have been below the management escapement goal of 5,000 age 1.3 and 1.4 fish, every year except for 1979 (Figure 2).

Little is known regarding the degree of interception of Alsek River chinook salmon in non-terminal fisheries. The goal of this study is to obtain information on migration patterns, fishery contributions and exploitation rates for the Alsek River stock. The objectives of this study were to:

1. Describe the migratory timing, harvest rates, and migration routes of Alsek River chinook salmon.
2. Estimate the relative abundance, growth rates, and length composition of juvenile chinook salmon in the Alsek River.
3. Evaluate the relative efficiency of inclined plane traps and baited minnow traps in capturing juvenile chinook salmon.
4. Investigate the feasibility of capturing and coded-wire tagging chinook salmon smolts during the spring of 1989.

METHODS

Wild, young-of-the-year (YOY) chinook salmon were captured, adipose-clipped, coded-wire tagged, and released in the Tatshenshini and lower Klukshu Rivers from September 21 through October 28, 1988. Trapping efforts were concentrated on a section of the Tatshenshini River approximately 0.5 km upstream of the abandoned settlement of Dalton Post, Y.T., downstream to the confluence of Village Creek and also on the lower 1.5 km

of the Klukshu River. Minnow trapping on the Klukshu River near the confluence of Vand Creek was discontinued after a short time due to low trap catches.

Juvenile chinook salmon were captured exclusively with standard minnow traps (Gee brand) baited with clusters of salmon roe. Between 50 and 100 minnow traps were fished daily during both the spring and fall tagging periods. All traps were checked, the juveniles removed, and the traps baited again and reset on a daily (approximately 24 hours) basis. The salmon roe was disinfected prior to use, by immersion in a dilute solution of betadyne at a ratio of 1:90 (1 part betadyne per 90 parts water) for 15 minutes.

Juvenile chinook salmon were transported from the various capture sites in live tanks to the field camp site and held in live pens. Chinook salmon YOY were then anesthetized with tricain methane sulfonate (MS 222), marked by removal of the adipose fin, and injected with a coded-wire tag using a Northwest Marine Technology (NMT) tag injector. The tag injector was modified to function under remote conditions by conversion to a 24 volt battery system (Koerner 1977). The 120 fish per pound head mold was used for tagging YOY chinook salmon.

The coded-wire tags were made of Type 302 stainless steel wire and were 1.0 mm in length and 0.25 mm in diameter. Each tag has a series of binary codes etched into the surface to identify the agency conducting the tagging study and the specific treatment of each tag lot. Coded-wire tags must be properly implanted in the cartilaginous wedge of the snout to ensure maximum retention. Therefore, tag placement was observed on several chinook salmon YOY each day by making a vertical incision through the dorsal median plane to the oral cavity. Head mold depth was adjusted accordingly if improper placement of tags was observed. Bisection and adjustment continued until tags were properly placed. Implanted coded-wire tags were magnetized by dropping tagged fish, head first, through a ring magnet into a bucket of water and then passing the fish through a NMT field sampling detector to check for the presence of a magnetized tag. All tagged chinook salmon were released in mainstem areas above or below the areas being trapped at the time of their release to minimize recaptures.

All YOY chinook salmon with missing adipose fins that were recaptured after being tagged, were checked with a NMT magnetic tag detector for the presence of a coded wire tag. This procedure was used to estimate the percentage of fish that had lost their tags. The total number of tags released was then adjusted for this in-river tag loss percentage. Approximately 5% of the coded-wire tagged chinook salmon were measured from the tip of the snout to the fork of tail to the nearest millimeter. Mean fork length of juvenile chinook salmon was calculated along with the associated standard error and 95% confidence intervals following procedures outlined in Zar (1974).

RESULTS

A total of 16,631 YOY chinook salmon were captured and coded-wire tagged during the study period (Table 1). Adjusting for an estimated tag loss percentage of 1.3% a total of 16,148 YOY chinook salmon with valid tags were released. Fork lengths were taken from a sample of 529 fish. These YOY chinook salmon averaged 64.4 mm (95% CI = 63.9 to 65.0 mm) and ranged from 48 to 88 mm fork length. Approximately 87% of the YOY chinook salmon were between 55 mm and 75 mm (Figure 3). Mean length of YOY chinook salmon did not appear to increase during the period from September 21 to October 28 (Figure 4).

Catches of YOY chinook salmon averaged 11.5 fish per trap-day during the study period. Catches declined from a high of nearly 25 fish per trap-day on September 24 to 6 fish per trap-day on October 28 (Figure 5). The highest trap catches were observed in areas of the Tatshenshini River with large organic debris such as root wads and log jams in shallow, braided, riffle areas with low current velocities. This pattern of habitat utilization by juvenile chinook salmon has been observed during previous tagging studies conducted on the Stikine, Taku, Unuk, and Chickamin Rivers (Kissner 1984; Kissner and Hubartt 1986; Hubartt and Kissner 1987).

One of the objectives of this study was to evaluate the feasibility of using inclined plane traps (IPT) to capture YOY chinook salmon in the lower Klukshu River. Unfortunately, we were not able to obtain these traps from the Canadian Department of Fisheries and Oceans until after the project was well underway. An additional objective of this study was to determine the feasibility of capturing chinook salmon smolts during the spring of 1989 in the Tatshenshini River below Dalton Post. This objective was not completed due to funding constraints and because of low water conditions during the spring in a whitewater canyon area of the Tatshenshini River just below the Klukshu River confluence. The primary objective of this study was to determine migration routes and estimate exploitation rates and fishery contributions of the Alsek River stock of chinook salmon. This objective will be met in future years when adult chinook salmon tagged as juveniles will be recovered in commercial and recreational fisheries and on the spawning grounds.

DISCUSSION

Although harvests have been reduced, chinook salmon escapements to the Alsek River are still below management escapement goals. Some researchers and many Alsek River commercial fishermen have hypothesized that predation on chinook salmon by marine mammals, in particular harbor seals, may be contributing to the slow rebuilding progress of this stock. Harbor seals do congregate in large numbers in the tidal area and are found upriver 23 km in the Alsek Basin (Gmelch 1982). An estimated 5% of all salmon caught in set gill nets in the lower Alsek River are lost to harbor seals (Gmelch 1982).

From May 20 to July 30, 1985, researchers from the Alaska Department of Fish and Game and the National Marine Fisheries Service, Auke Bay Laboratory attempted to capture chinook salmon smolts in the lower Alsek River in Dry Bay with beach seines and traps. Only 81 chinook salmon smolt were captured along with 217 coho and 998 sockeye salmon smolts. These catches of chinook salmon were much lower than expected, leading some researchers to postulate that increased silification and subsequent changes in channel morphology (Gmelch 1982) in the lower Alsek River estuary in Dry Bay may be contributing to reduced survival of juvenile chinook salmon emigrating from the Alsek River (Adrian Celewycz, National Marine Fisheries Service, Auke Bay Laboratory, Auke Bay, Alaska, personal communication). Other possible explanations for the slow progress of rebuilding are 1) the management escapement goal for the Alsek River stock is higher than it should be to achieve optimum sustained production and 2) Alsek River chinook salmon are harvested to a greater extent in mixed stock domestic or high-seas, foreign gill net fisheries than previously believed.

I feel that the current depressed status of the Alsek River stock of chinook salmon may have resulted from some combination of the above factors. I recommend that coded-wire tagging studies be continued to determine migratory patterns and harvest rates of Alsek River chinook salmon. This research will provide information on migration routes, areas and timing of harvest, and exploitation rates and may provide insight into the primary

reasons for the decline of the stock. In addition, this information will be useful in developing management and conservation measures required to rebuild this chinook salmon stock to desired escapement goals.

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Table 1. Summary of trapping and coded-wire tagging of YOY chinook salmon on the Alsek River from September 21 to October 28, 1988.

Date	Traps Checked	Number Tagged	Number Recap.	Tags Retained	Tag Code	Mean Length (mm)	Sample Size
09/21	12						
09/22	42						
09/23	53	2,125			4-29-29		
09/24	0	541			4-29-29	63.4	150
09/25	19						
09/26	19						
09/27	1						
09/28	39						
09/29	46	4,486	30	30	4-29-29		
09/30	57	1,212	53	52	4-29-29		
10/01	0						
10/02	44						
10/03	50						
10/04	25	1,745	26	26	4-29-29		
10/05	10						
10/06	44						
10/07	62						
10/08	64	412	45	45	4-29-29	65.4	128
10/09	65	1,364	101	99	4-29-29		
10/10	66						
10/11	55	1,519	60	59	4-29-30		
10/12	87	1,208					
10/13	80	1,016	60	60	4-29-30		
10/14	0	775	60	59	4-29-30		
10/15	14						
10/16	80						
10/17	11						
10/18	39						
10/19	0						
10/20	64	700	56	56	4-29-30	65.9	103
10/21	48						
10/22	88						
10/23	0	1,455	116	112	4-29-30		
10/24	0						
10/25	65						
10/26	33						
10/27	23						
10/28	17	851	92	92	4-29-30	63.6	148
Totals	1,422	16,361	699	690		64.6	529
<u>Overall Statistics:</u>							
Catch/trap			11.5			Valid Tags Released: (4-29-29) = 8,722 (4-29-30) = 7,426	
Tag Retent.			98.7%				
Mean Length			64.6				
Range =		48 mm to 88 mm					
Standard Error =		0.503					

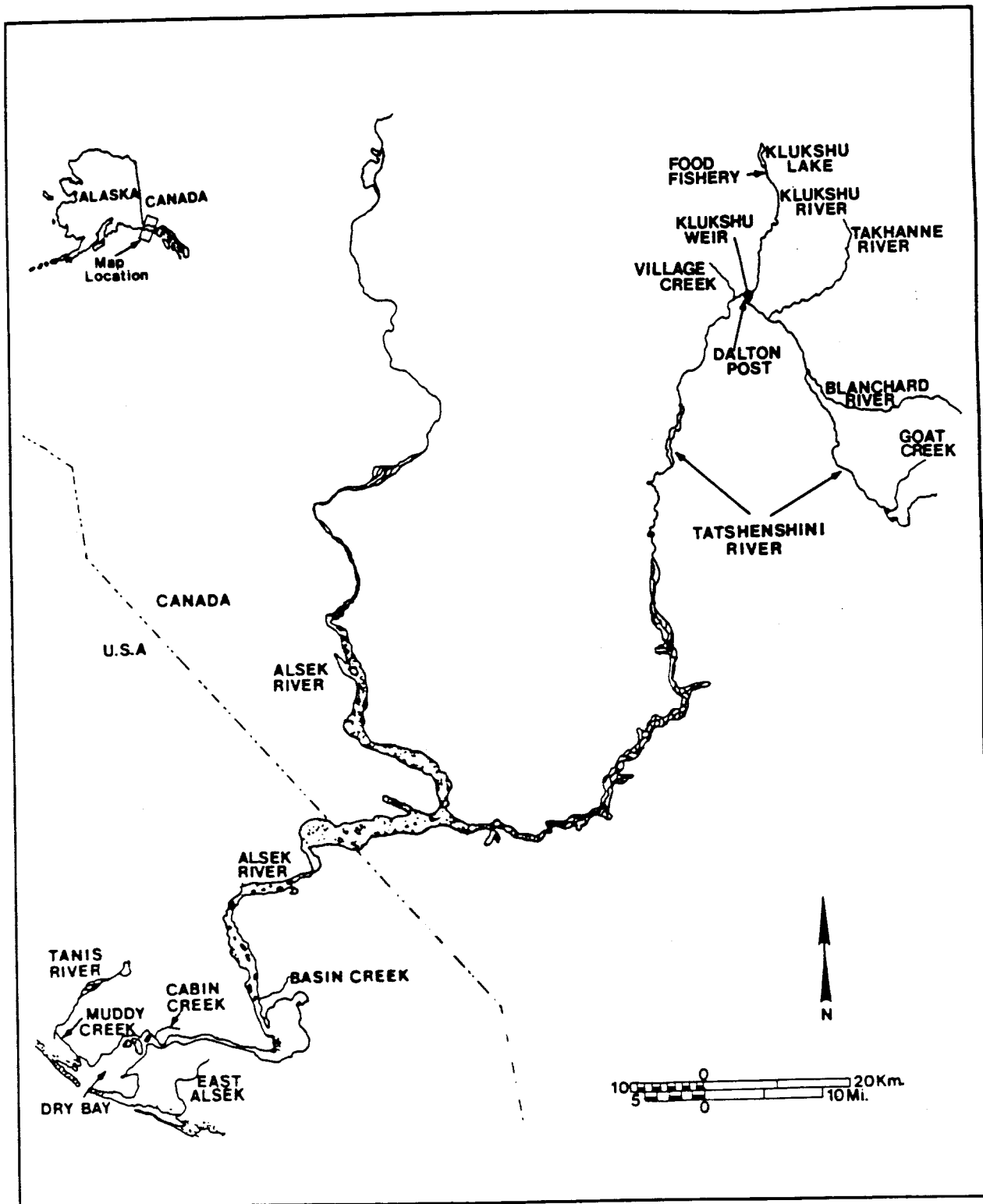


Figure 1. Alsek River drainage.

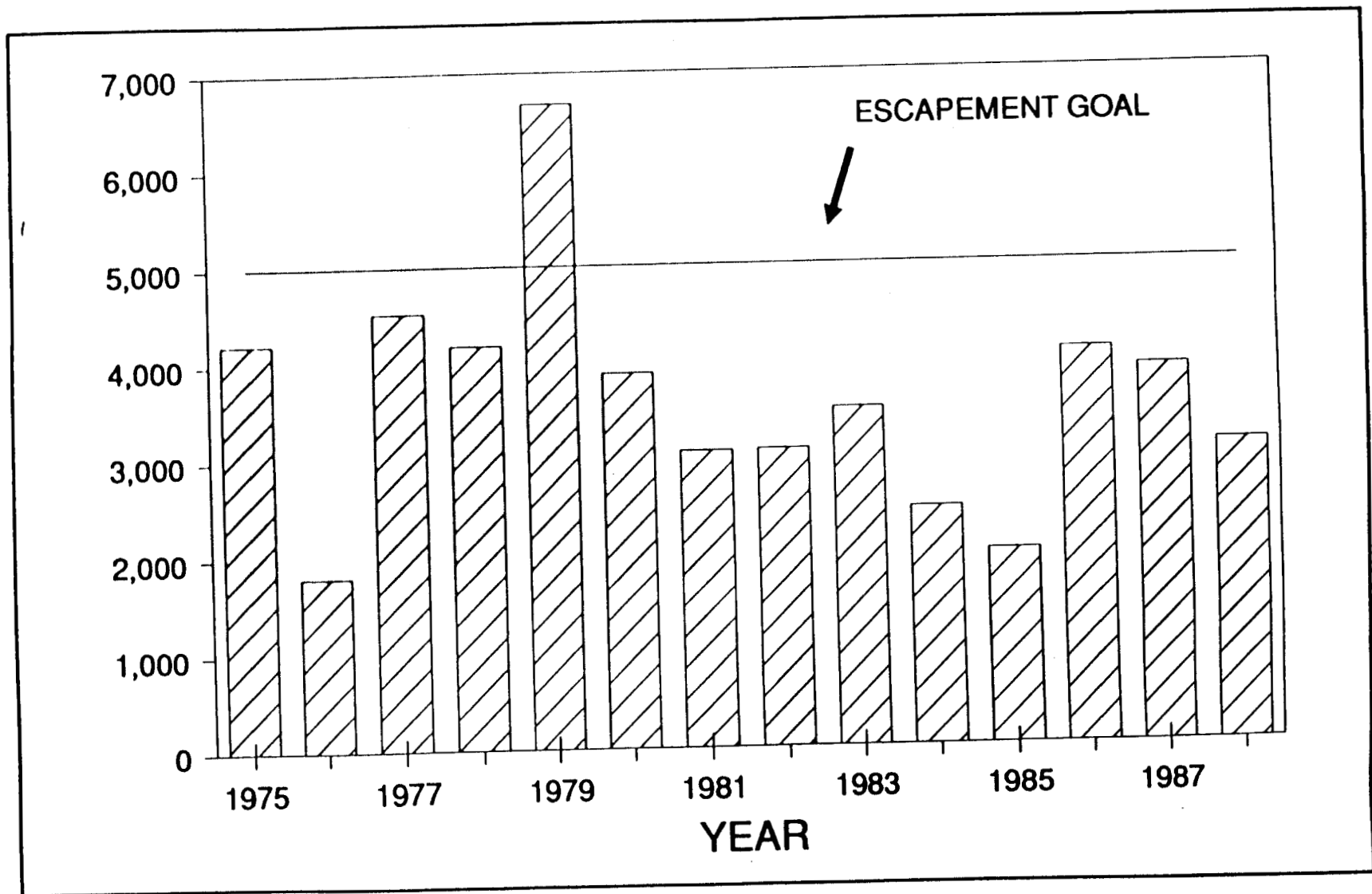


Figure 2. Escapements of chinook salmon in the Alsek River from 1986-1988.

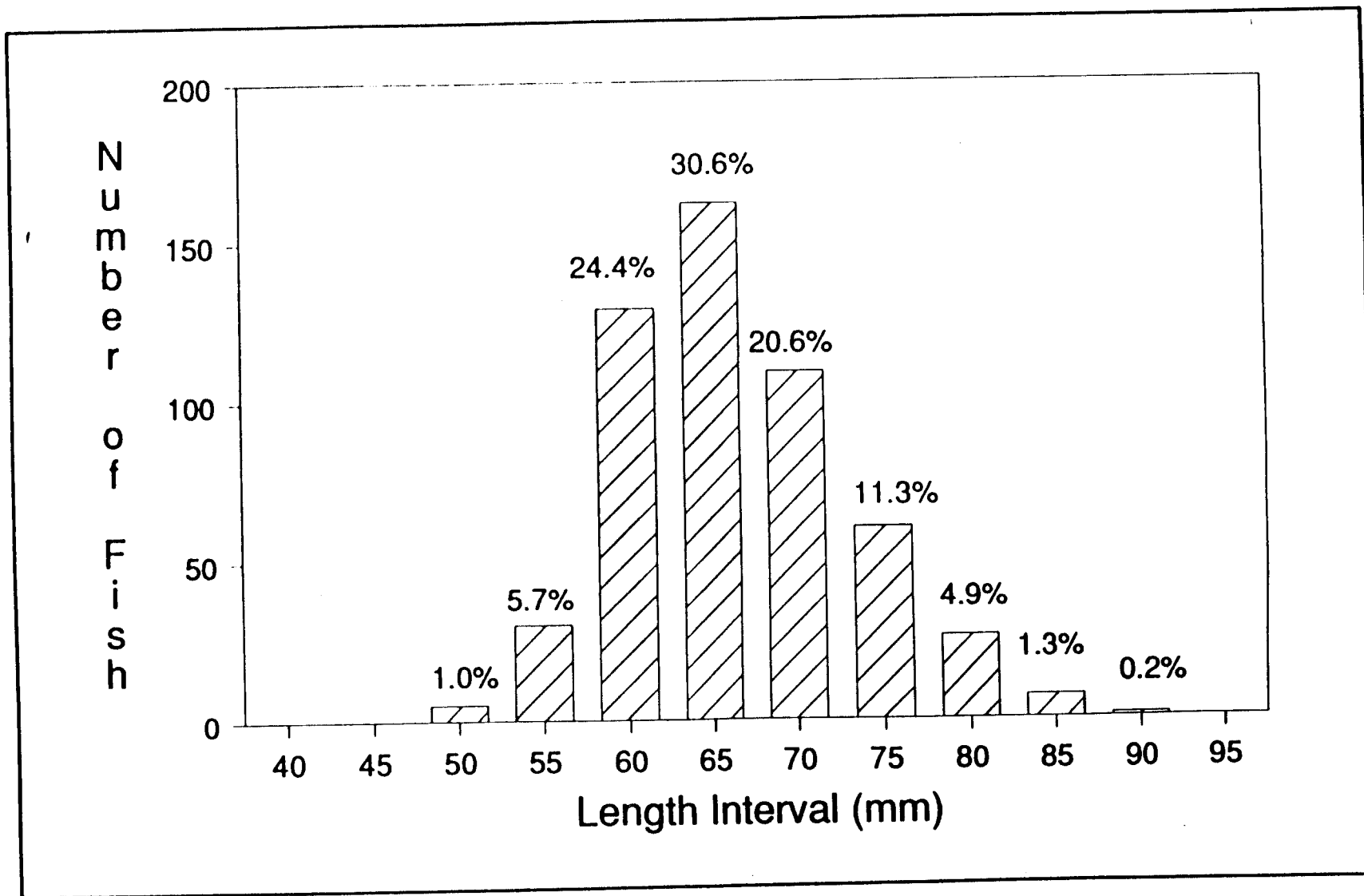


Figure 3. Length distribution of young-of-the-year chinook salmon captured in the Tatshenshini and Klukshu Rivers in September and October, 1988.

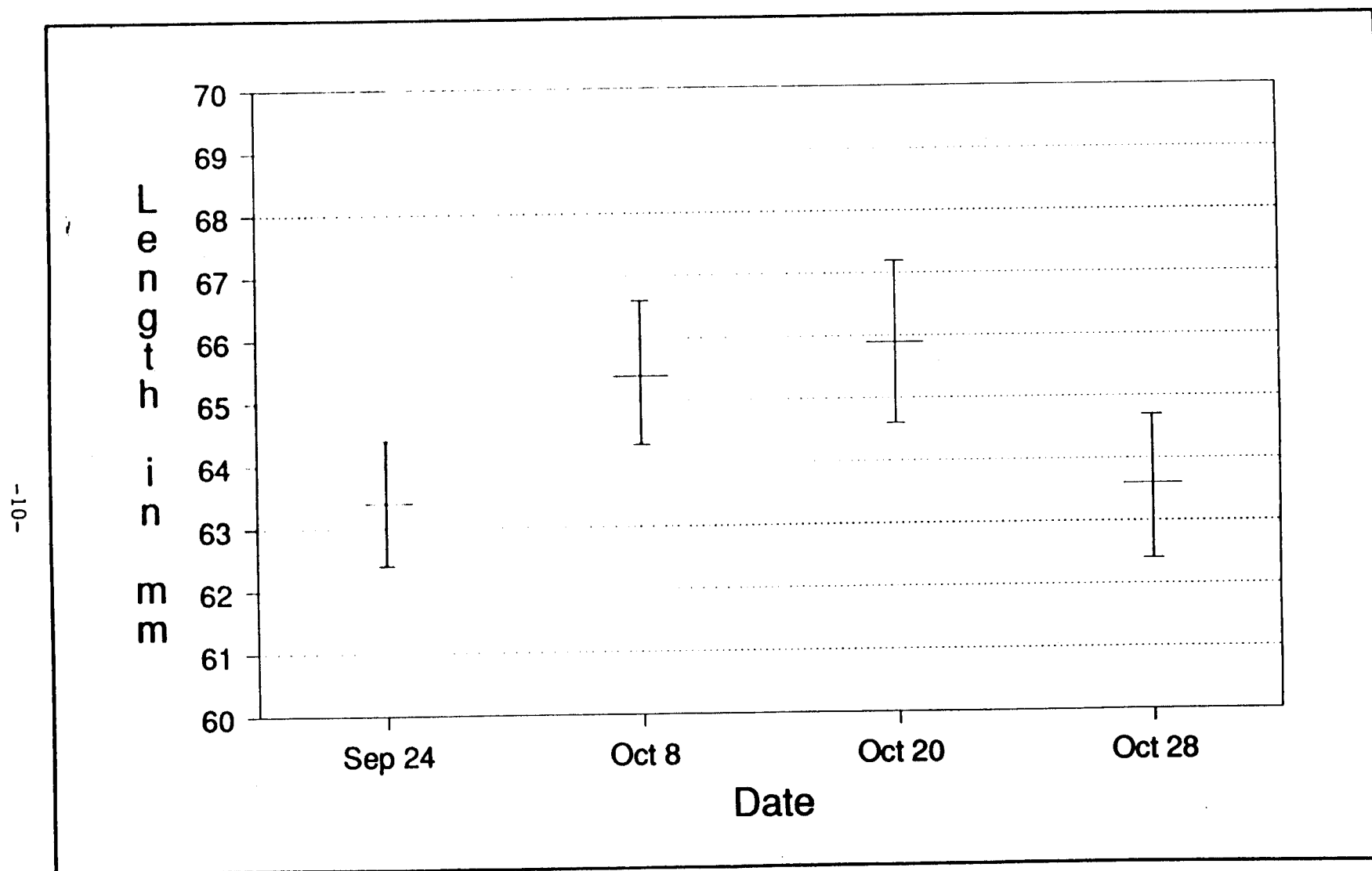


Figure 4. Comparison of mean lengths of young-of-the-year chinook salmon captured in the Tatshenshini and Klukshu Rivers in September and October, 1988 (mean lengths indicated by horizontal bars; vertical bars represent 95% confidence intervals).

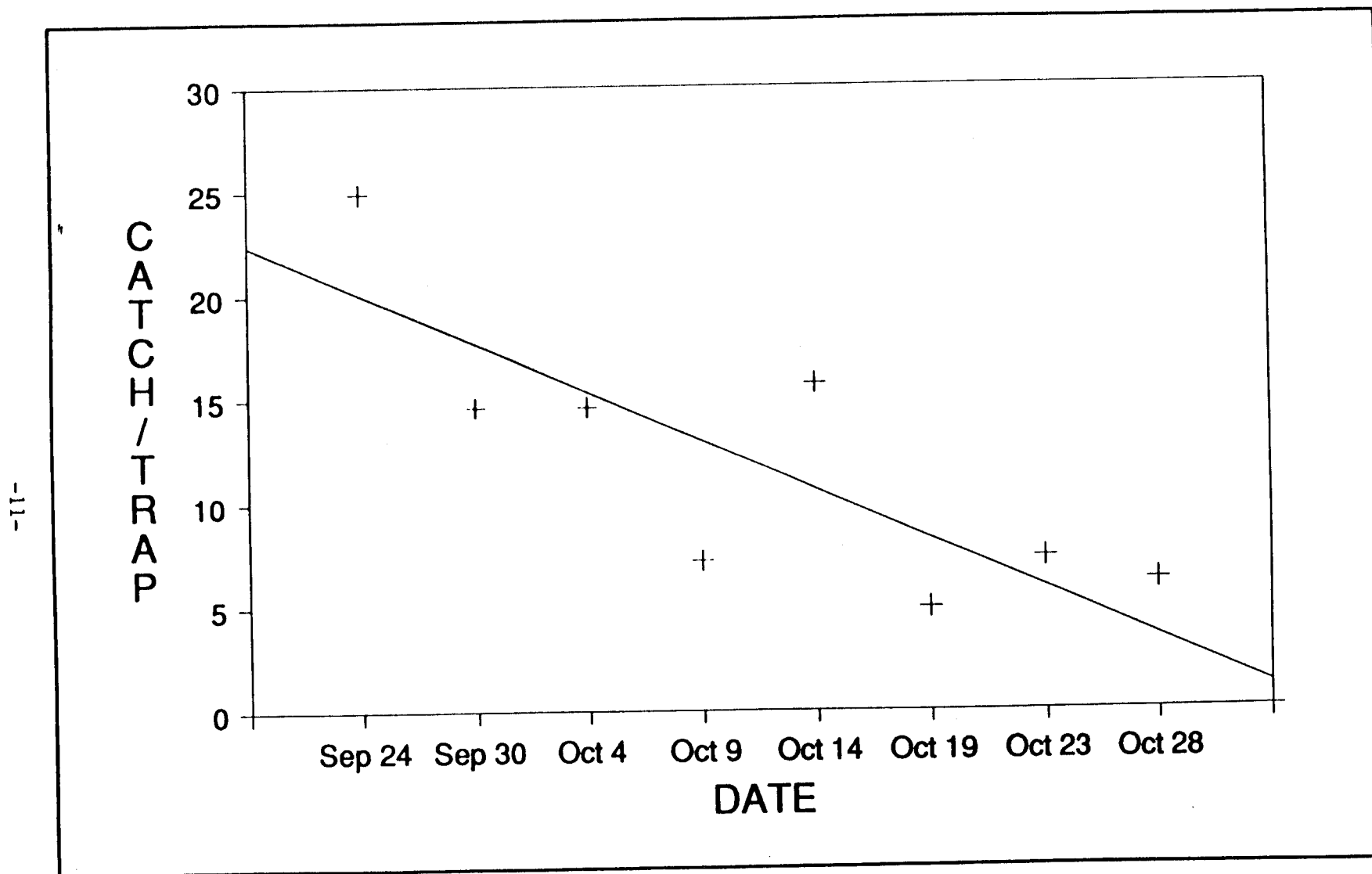


Figure 5. Catch per trap of young-of-the-year chinook salmon in the Tatshenshini and Klukshu Rivers in September and October, 1988.

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